GUARDRAIL & SLOPE FLATTENING CHECKLIST

1) DETERMINE DESIGN REQUIREMENTS AND PARAMETERS

- Design Speed / Posted Speed
- Average Daily Traffic - ADT
- One Way Or Two Way Roadway
- Check Roadway Widths And Shoulder Widths
- Determine Applicable Clear Zone Distance
- Check Right-Of-Way Limits
- Check Accident History
- Check Applications Along Corridor For Consistency
  Are Guard Rail Or Slopes Within Current Design Criteria?
- Use Roadside Design Guide
- Coordinate Requirements With Customers (District, Private Owners, Utilities, Etc.)

2) FOREST SERVICE AND/OR ENVIRONMENTAL REQUIREMENTS

- Determine Type Of Guard Rail To Use - Need Aesthetic Post And Rail Treatment?
- Obtain Forest Service Access Points From The Highway
- Are There Riparian Or Wetland Conditions Existing?
- Are There Clean Water Concerns, A Need For 401 And/Or 404 Permits?
- Are There Cultural Resources To Be Addressed, e.g., Archaeological Sites?
- Are There Biological Resources To Be Addressed, e.g., Big Horn Sheep Crossings?
- Are There Harzardous Waste Concerns In The Area?

3) OFFICE AND FIELD REVIEW DATA COLLECTION

Verify all applicable as-built roadway elements

FOR GUARD RAIL TREATMENTS

- Check Type Of Existing Guard Rail
- Check Existing Height Of Guard Rail
- Check Length Of Existing Guard Rail
- Check The New Pavement Structural Section Thickness
- Check Future Height Of Guard Rail After Overlay In Place
- Check Existing Condition Of Guard Rail
- Check Location Of Cut, Fill Transitions
- Check Distance From Edge Of Shoulder To Cut Ditch
- Check Length And Slope Of Existing Backslope
- Check Location Of Beginning Of Backslope (At Edge Of Pavement?)
- Check Existing Bridge Dado Treatments
- Check Existing Guard Rail End Treatments
- Check Existing Guard Rail To Bridge End Transition Treatments
- Check Existing Bridge Rail - Replace? (Substandard Structurally Or Geometically?)
- Check Special Conditions/Openings Required In Snow Country
- Check Location Of Utilities
- Check Depth Of Existing Culverts For Post Clearances
- Determine Roadside Hazards Or Obstructions - Nontraversable Or Fixed Objects
- Check Sight Distances At Turnouts
- Check Use Of Guard Rail On Design/Construction Projects Currently Underway

FOR SLOPE FLATTENING TREATMENTS

- Check Roadway Cut And Fill Heights, Cut And Fill Slopes, And Slope Transitions
- Check Cut Slope Material Type. Difficulty Removing? Useful For Fill Material?
- Need Material Source For Embankment For Flattening Slopes?
- Slope Flattening In Cut Sections To Generate Material For Embankment?
- Identify And Verify As-Built Culverts - Type, Size And Location
- Check Condition Of Channel
- Determine Existing Scour Protection Features
- Identify Any Inlet, Outlet Scour Concerns
- Identify Abrasion Type Material In Channel And Potential For Abrasion
- Check Slope Treatments On Design/Construction Projects Currently Underway
- Check Location Of Utilities, Survey Monuments. Will They Be Covered Up?

4) REQUEST ENGINEERING SURVEY

(This Information Can Be Obtained By The Designer Or Using Engineering Survey Section)

FOR GUARD RAIL TREATMENTS

- Locate Existing Guard Rail - Use Stationing Or Milepost
- Obtain Height Of Existing Guard Rail
- Obtain Length Of Existing Guard Rail

FOR SLOPE FLATTENING TREATMENTS

- Obtain Cross Sections In Fill Areas Up To 8 To 10 Feet High
- Obtain Channel Invert Alignment And Invert Elevations At Pipe Ends
- Obtain Location And Length Of Existing Fence Around Culvert

5) INFORMATION FROM DISTRICT

- Type Of Existing Pipe - Galvinized Or Aluminized Steel, Aluminum, Etc.
- Condition Of Existing Culverts
- Type And Condition Of Existing Fence Around Culvert
- Any Over-Topping Or Scour Concerns?
- Condition Of Existing Guard Rail

6) NEW GUARD RAIL TREATMENTS

- Determine Length Of Need
- Determine End Treatments
- Determine Guard Rail Installation Type. Require 2' Widening?
- Remove And Salvage Existing Guard Rail?
- Reconstruct Existing Guard Rail?
- Determine Bridge Rail To Guard Rail Transitions - On Or Off Structure?
- Replace Or Reconstruct Existing Bridge Rail?
- Provide Drainage At Cut Area Close To Bridge Ends
- Determine Need For Phased Construction To Protect Against Steep Slopes

GUARDRAIL & SLOPE FLATTENING CHECKLIST

7) NEW SLOPE FLATTENING TREATMENTS

- Determine New Fill Slope, Toe Of Slope And Volume Of Embankment
- Determine Culvert Size And Extension Length
- Determine Culvert Inlet, Outlet End Treatment
- Determine Treatment For Abrasion
- Determine Culvert Inlet, Outlet Scour Protection Treatment
- Determine If Channel Needs Realigning And/Or Scour Protection
- Determine Need For Bank Protection, e.g., Rail Bank, Gabions, Etc
- Determine New Right-Of-Way, TCE Or Drainage Easement Needs
- Determine Affect Of Environmental Concerns

8) COST COMPARISON

- Determine Cost Comparison Between Slope Flattening And Guard Rail Treatment
- If Cost Ratio Is Less Than 3:1, Slope Flattening Is Viable

9) DOUBLE CHECK DESIGN

10) DETERMINE TCE REQUIREMENTS

11) DETERMINE QUANTITIES AND COST

12) FINALIZE DRAFTING

13) TRANSFER NECESSARY INFORMATION TO SUMMARY SHEETS

14) UPDATE PROJECT ESTIMATE

15) VERIFY THAT CUSTOMER REQUIREMENTS ARE MET

16) HAVE WORK CHECKED ONE SHEET AT A TIME AS BEING DEVELOPED

17) DOCUMENT WORK AND FILE NECESSARY DOCUMENTATION

GUARDRAIL & SLOPE FLATTENING
CHECK LIST

PROJECT NO. _____ - _____ - _____

DGN	CHK		DGN	CHK
GUARD RAIL - PLANS SHEETS			**GUARD RAIL - SUMMARY SHEETS**	
❑	❑	PLANS SHEET REFERENCE NO.	❑	❑ PROJECT NUMBER
❑	❑	BEGINNING STATION	❑	❑ DESCRIPTION IN TITLE BOX
❑	❑	END STATION	❑	❑ BEGINNING STATION
❑	❑	END TREATMENTS	❑	❑ TYPE OF INSTALLATION
❑	❑	EXISTING, NEW, OR RECONSTRUCT GUARD RAIL	❑	❑ BARRIER TYPE
			❑	❑ TRANSITION
			❑	❑ END TREATMENT
			❑	❑ MISCELLANEOUS
			❑	❑ REMARKS

DESIGNED BY _____ **DATE** _____/____/_____

CHECKED BY _____ **DATE** _____/____/_____

GUARDRAIL & SLOPE FLATTENING
CHECK LIST

PROJECT NO. _____ - _____ - _____

DGN	CHK		DGN	CHK	

SLOPE FLATTENING - DESIGN SHEETS

- ❑ ❑ SLOPE EXCEPTION TABLE
- ❑ ❑ EARTHWORK SUMMARY

SLOPE FLATTENING - PLANS SHEETS

- ❑ ❑ CULVERT PLAN VIEW
- ❑ ❑ CULVERT REFERENCE NO.
- ❑ ❑ TOE OF SLOPE FILL LINES
- ❑ ❑ DRAINAGE EASEMENTS
- ❑ ❑ TCEs OR NEW RIGHT-OF-WAY
- ❑ ❑ PEAK FLOW, HIGH WATER

SLOPE FLATTENING - DETAIL SHEETS

- ❑ ❑ PROJECT NUMBER
- ❑ ❑ DESCRIPTION IN TITLE BOX
- ❑ ❑ LEGEND
- ❑ ❑ ROADWAY EDGE LINES & CENTERLINE
- ❑ ❑ CULVERT PLAN VIEW - EXISTING AND NEW
- ❑ ❑ CULVERT REFERENCE NO.
- ❑ ❑ NEW TOE OF SLOPE
- ❑ ❑ TCEs OR RIGHT-OF-WAY
- ❑ ❑ DRAINAGE EASEMENTS
- ❑ ❑ TOE OF FILL SLOPE
- ❑ ❑ END TREATMENTS
- ❑ ❑ DRAINAGE CHANNELS
- ❑ ❑ SCOUR PROTECTION
- ❑ ❑ CHANNEL/BANK PROTECTION
- ❑ ❑ EXISTING ROADWAY AND CULVERT CROSS - SECTION
- ❑ ❑ NEW CULVERTS OR EXTENSIONS PROFILE
- ❑ ❑ CULVERT LENGTH
- ❑ ❑ REMOVAL DIMENSIONS
- ❑ ❑ EXTENSION DIMENSIONS
- ❑ ❑ CULVERT INVERT ELEVATIONS
- ❑ ❑ CULVERT SLOPE
- ❑ ❑ CULVERT STATION
- ❑ ❑ CULVERT SIZE & LENGTH
- ❑ ❑ SHOW UTILITIES (only show in profile if accurate location is known)
- ❑ ❑ SHOW EXISTING FENCE
- ❑ ❑ SHOW NEW FENCE

SLOPE FLATTENING - SUMMARY SHEETS

- ❑ ❑ PROJECT NUMBER
- ❑ ❑ DESCRIPTION IN TITLE BOX
- ❑ ❑ STATION LOCATION
- ❑ ❑ DESCRIPTION
- ❑ ❑ CULVERT TYPE
- ❑ ❑ END TREATMENT
- ❑ ❑ QUANTITIES
- ❑ ❑ REMARKS

DESIGNED BY _____ **DATE** _____/____/_____

CHECKED BY _____ **DATE** _____/____/_____